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CLINICAL ARTICLE

Patterns in training, knowledge, and performance of skilled birth attendants providing emergency obstetric and newborn care in Afghanistan

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ABSTRACT

Objective: To assess current skilled birth attendants (SBAs) in Afghanistan, looking for opportunities to improve quality and expand emergency obstetric and newborn care (EmONC) services. *Methods:* The EmONC training, knowledge, and skills of 82 doctors and 142 midwives in 78 facilities were assessed using interviews, knowledge tests, observation of performance on anatomic models, and decision-making scenarios. *Results:* Three-quarters had training in at least half of the 24 possible skills. Doctors' and midwives' levels of training in specific skills were generally similar. Doctors were more likely to be very confident of their skills. Midwives and doctors scored similarly in assessments of decision making and performance of technical skills. SBAs showed weaknesses in specific steps to manage common high-risk emergencies. Decision-making skills were good in a maternal care scenario but weak on managing a newborn not breathing. Doctors' and midwives' scores were similar. *Conclusion:* Midwives and doctors in Afghanistan are similarly competent. Focusing on training and deploying midwives may be cost effective without diminishing quality. In-service training and job rotation could help SBAs retain their EmONC skills. Training and practice to manage common high-risk emergencies deserve priority.

1. Introduction

In Afghanistan, the maternal mortality ratio (MMR) and newborn mortality rate remain high despite noteworthy progress rebuilding the health system over the past 10 years. WHO has estimated that the MMR in 2008 was 1400 maternal deaths per 100 000 live births [1], compared with an estimated 1600 in 2005 [2]. Similarly, the neonatal mortality rate in 2009 was estimated at 52 per 1000 births [3], compared with 60 in 2000 [4]. Despite this progress, severe shortage of skilled birth attendants (SBAs)—doctors and midwives [5]—particularly in rural areas, remains the key challenge.

In a number of other low-resource settings, SBAs have proved to be key to reducing maternal mortality [6,7]. In Afghanistan in 2002, there were only 489 midwives associated with government healthcare facilities, and 1171 female doctors and nurses. Of the 48% of facilities assigned for basic emergency obstetric and newborn care (EmONC), only 18% had all of the necessary equipment and staff [8]; furthermore, only 24% of all hospitals provided cesarean delivery and 13% reported having a blood bank [8].

Some progress has been made. The percentage of women delivered by an SBA increased from 19% in 2005 [9] to 24% in 2008 [10]. Since 2001, 6 governmental and a small number of private universities have graduated medical doctors, and 8 teaching hospitals have residency programs for obstetricians and gynecologists; the government has not published the number of graduates. Between 2003 and 2009, 2684 licensed midwives graduated from 2-year midwifery education programs at 5 Institutes of Health Sciences and 34 Community Midwifery Education schools with almost identical competency-based curricula [11].

The primary strategy for scaling-up healthcare services in Afghanistan has been the implementation of a Basic Package of Health Services (BPHS) and an Essential Package of Hospital Services (EPHS). The BPHS, which has been rolled out to 86% of the country, consists of health posts, sub-health centers, basic health centers, comprehensive health centers (CHCs), and district hospitals (DH)s. The EPHS includes provincial hospitals (PHs), regional hospitals (RHs), and specialized hospitals (SHs), including 5 maternity hospitals located in Kabul. All hospitals and some enhanced CHCs are considered comprehensive EmONC (CEmONC) centers, which serve as the referral sites for lower-level facilities.

Until recently, a formal assessment of the training, knowledge, and performance of SBAs in Afghanistan had been lacking. In 2009, Jhpiego, with financial support from UNICEF, conducted a comprehensive needs assessment of EmONC services [12]. The assessment addressed various aspects of care—including infrastructure, supplies, and the training, knowledge, and skills of providers—as well as case review and

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observation of cesarean deliveries [13,14]. The aim of the current paper was to present results of the human resource assessment of the EmONC training, knowledge, and skills of obstetric care providers at CEmONC facilities.

2. Materials and methods

Of the 127 CEmONC facilities in Afghanistan, 78 were included in the study; the other 49 were inaccessible owing to security concerns. The facilities comprised 9 CHCs, 34 DHs, 25 PHs, 5 RHs, and 5 SHs. The intention was to select all doctors and midwives from each CHC, and 2 doctors and 2 midwives from hospitals randomly. In 3 of the CHCs and 13 of the DHs, however, no doctor was available at the time of data collection. In total, 82 doctors and 142 midwives—all female—were recruited. The study received approval from the Institutional Review Boards of the Afghanistan Ministry of Public Health (MoPH) and of Johns Hopkins University, Baltimore, USA. Informed consent was obtained from all participants.

Three complementary assessment methods were used: a knowledge questionnaire based on Averting Maternal Death and Disability model assessment forms [15]; 2 hypothetical scenarios for assessing decision making in EmONC care (eclampsia and newborn resuscitation); and the national midwifery education schools' tool to assess providers' EmONC skills using anatomic models. The tools were reviewed, revised, and approved during a workshop involving MoPH national EmONC trainers, UNICEF, WHO, and experts from Afghanistan non-governmental organizations (NGOs) operating MoPH facilities. The tools were pilot-tested during the training for data collectors.

Data collection took place between December 1, 2009, and May 31, 2010. The field research team consisted of 6 doctors and 38 midwives; all of them were female and experienced service providers who had worked with NGOs and who had substantial experience with data collection in other research studies in the provinces. Jhpiego Afghanistan trained the data collectors for 1 week and tested their intra-assessor and inter-assessor reliability.

Descriptive, *t* test, and linear regression analyses were performed to compare knowledge, confidence, decision-making skills, and performance skills between doctors and midwives. Pairwise correlation and linear regression analyses were used to estimate the association of knowledge and confidence with decision-making and performance skills, both among individuals and—using an average group score—at the facility level. For the regression analyses, 3 control variables were used: patient volume in the past 12 months in facilities using the National Health Management and Information System; years of experience of the workers; and a composite score grading the availability of infrastructure, equipment, and supplies. STATA version 11 (StataCorp, College Station, TX, USA) was used for statistical analysis. All statistics were calculated at a 5% significance level.

3. Results

On average, doctors and midwives were trained in a very similar number of 24 selected skills: 16.5 for doctors and 15.7 for midwives, with no significant difference even after controlling for length of experience and patient load (*t* test, $P=0.398$). In total, 76.1% of midwives and 73.2% of doctors (χ^2 test, $P=0.631$) had received training in at least 12 of the 24 skills. Between 70.0% and 85.0% of the service providers had been trained in most skills: 16 for doctors and 15 for midwives. Approximately 85% of both doctors and midwives reported receiving training in active management of the third stage of labor (AMTSL), and 80.1% and 82.7%, respectively, had been trained in resuscitation of a newborn (Table 1). Overall, 69.3% of doctors and 60.1% of midwives were trained in kangaroo mother care. Less than 50% of both doctors and midwives reported receiving training in applying forceps, treating newborn sepsis, and administering antiretroviral medications for preventing mother-to-child transmission (PMTCT) of HIV. No provider had received training in all 24 skills.

More midwives than doctors were trained in partograph use (74.4% vs 84.4%) and family-planning counseling (76.3% vs 85.0%). Significantly more doctors than midwives were trained in applying

Table 1
Training experience and level of confidence in performing specific EmONC skills, as reported by doctors and midwives in Afghanistan.

Skills	Reported receiving training				Reported being "very confident"			
	Doctors		Midwives		Doctors		Midwives	
	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)	No.	% (95% CI)
Focused prenatal care	79	77.2 (67.8–86.7)	140	81.4 (74.9–88)	75	86.7 (78.8–94.5)	135	87.4 (81.7–93.1)
Use of partograph	78	74.4 (64.5–84.3)	141	84.4 (78.3–90.5)	69	84.1 (75.2–92.9)	134	87.3 (81.6–93.0)
AMTSL	78	84.6 (76.4–92.8)	141	85.1 (79.2–91.1)	77	93.5 (87.9–99.1)	138	93.5 (89.3–97.6)
Manual removal of the placenta	77	76.6 (67–86.3)	140	82.1 (75.7–88.6)	75	93.3 (87.6–99.1)	134	85.1 (79.0–91.2)
Beginning IV fluids	77	79.2 (70.0–88.5)	140	83.6 (77.4–89.8)	68	95.6 (90.6–100)	139	96.4 (93.3–99.5)
Checking for anemia	78	79.5 (70.3–88.7)	140	78.6 (71.7–85.5)	75	92 (85.7–98.3)	137	86.1 (80.3–92.0)
Administering IM or IV magnesium sulfate to treat severe pre-eclampsia/eclampsia	78	82.1 (73.3–90.8)	140	78.6 (71.7–85.5)	75	90.7 (83.9–97.4)	132	75 (67.5–82.5) [a]
Treating infection during labor, delivery, and post partum	77	77.9 (68.4–87.4)	139	69.1 (61.3–76.8)	77	88.3 (81.0–95.7)	130	69.2 (61.2–77.3) [a]
Treating PPH	77	79.2 (70.0–88.5)	139	77.0 (69.9–84.1)	77	90.9 (84.3–97.5)	134	75.4 (68.0–82.8) [a]
Bimanual uterine compression (external)	78	73.1 (63.0–83.1)	139	67.6 (59.8–75.5)	70	90.0 (82.8–97.2)	116	62.1 (53.1–71) [a]
Bimanual uterine compression (internal)	78	71.8 (61.6–82.0)	139	62.6 (54.4–70.7)	69	79.7 (70.0–89.4)	110	50.0 (40.5–59.5) [a]
Suturing episiotomy	77	79.2 (70.0–88.5)	140	82.1 (75.7–88.6)	76	92.1 (85.9–98.3)	136	86.8 (81.0–92.5)
Suturing vaginal lacerations	77	79.2 (70.0–88.5)	140	77.9 (70.9–84.8)	75	90.7 (83.9–97.4)	132	72.7 (65.0–80.4) [a]
Suturing cervical lacerations	76	69.7 (59.2–80.3)	139	53.2 (44.8–61.6)	64	68.8 (57.1–80.4)	110	28.2 (19.6–6.7) [a]
Applying vacuum extractor	77	71.4 (61.1–81.7)	138	73.2 (65.7–80.7)	71	77.5 (67.5–87.4)	128	64.1 (55.6–72.5)
Applying forceps	75	44.0 (32.5–55.5)	137	13.9 (8.0–19.7) [a]	58	48.3 (35.0–61.5)	89	7.9 (2.2–13.6) [a]
Performing MVA	77	71.4 (61.1–81.7)	140	70.0 (62.3–77.7)	71	70.4 (59.5–81.3)	126	58.7 (50.0–67.4)
Dilatation and curettage	78	67.9 (57.4–78.5)	137	42.3 (34.0–50.7) [a]	70	82.9 (73.8–91.9)	115	38.3 (29.2–47.3) [a]
Family-planning counseling	76	76.3 (66.5–86.1)	140	85.0 (79.0–91.0)	70	90.0 (82.8–97.2)	137	94.2 (90.2–98.1)
Adult resuscitation	76	69.7 (59.2–80.3)	138	71.7 (64.1–79.3)	69	84.1 (75.2–92.9)	126	71.4 (63.4–79.4)
Treating newborn sepsis	77	49.4 (37.9–60.8)	137	20.4 (13.6–27.3) [a]	66	51.5 (39.1–63.9)	97	13.4 (6.5–20.3) [a]
Resuscitation of newborns with bag/mask	78	80.8 (71.8–89.7)	139	82.7 (76.4–89.1)	72	76.4 (66.3–86.4)	134	82.8 (76.4–89.3)
Kangaroo mother care	75	69.3 (58.7–80)	138	60.1 (51.9–68.4)	65	75.4 (64.6–86.1)	115	76.5 (68.7–84.4)
Administering ARVs for PMTCT of HIV	76	11.8 (4.4–19.3)	133	5.3 (1.4–9.1)	57	10.5 (2.3–18.7)	89	4.5 (0.1–8.9)

Abbreviations: AMTSL, active management of the third stage of labor; ARV, antiretroviral; CI, confidence interval; EmONC, emergency obstetric and newborn care; IM, intramuscular; IV, Intravenous; MVA, manual vacuum aspiration; PMTCT, prevention of mother-to-child transmission; PPH, postpartum hemorrhage.

[a] There is no overlap of the 95% CIs showing significant difference between doctors and midwives at $P<0.05$.

forceps (44.0% vs 13.9%), dilatation and curettage (67.9% vs 42.3%), and detection of newborn sepsis (49.4% vs 20.4%) ($P<0.05$).

At least 90% of both doctors and midwives reported being "very confident" in providing AMTSL, intravenous fluids, and family-planning counseling. At least 90% of doctors were also very confident in performing 7 other skills. In total, 90.7% of doctors reported being very confident in repairing vaginal lacerations, but only 68.8% were very confident in repairing cervical lacerations. The skills in which the fewest doctors and midwives were very confident were applying forceps, treating newborn sepsis, and to a lesser extent manual vacuum aspiration (MVA).

Significantly more doctors than midwives reported being very confident in 9 of 23 skill areas: administration of magnesium sulfate ($P=0.006$); treatment of infection ($P=0.002$); external bimanual uterine compression ($P<0.001$); internal bimanual compression ($P<0.001$); suturing vaginal lacerations ($P=0.002$); suturing cervical lacerations ($P<0.001$); applying forceps ($P<0.001$); dilatation and curettage ($P<0.001$); and treatment of newborn sepsis ($P<0.001$). Significantly more doctors than midwives reported being very confident in treating postpartum hemorrhage and bimanual compression of the uterus. Also, the mean number of skills in which doctors reported being very confident was significantly higher than that reported by midwives (16.6 vs 14.3; $P=0.004$) (Table 1).

Midwives' levels of confidence in several skills were lower than their levels of training—in particular, suturing cervical lacerations, applying a vacuum extractor, and performing MVA (Table 1).

The average knowledge scores were 72.9% for AMTSL and 84.1% for signs of labor. The scores ranged from 65.1% to 75.5% for postpartum hemorrhage. Knowledge scores were 60% or below in many areas: signs and symptoms of infection in the newborn; treating newborn infection; care for a low birth weight newborn; treating complications of incomplete or unsafe abortion and what information to give to affected women; medical care for a rape survivor; which pregnant women might need a special care plan; and managing retained placenta (Table 2). Average knowledge scores were 67.5% and 62.9% for doctors and midwives, respectively ($P=0.062$). Following adjustment for control variables, doctors and midwives were similar in 14 of 16 areas but doctors scored significantly higher than midwives in knowledge of symptoms of newborn infection ($P=0.005$) and treatment for immediate complications of unsafe abortion ($P<0.001$).

Observation of providers working with anatomic models covered 5 procedures: normal labor and delivery; manual removal of the placenta (MROP); MVA and postabortion care; vacuum extraction; and newborn resuscitation. The scores ranged from 61.8% to 77.0%, with no statistically significant differences between doctors and midwives (Table 3).

Table 3
Performance scores on anatomic models.[a]

Skills	Doctors		Midwives	
	No.	Average (95% CI)	No.	Average (95% CI)
Normal labor and delivery	54	70.3 (65.4–75.1)	104	75.5 (72.3–78.7)
Manual removal of the placenta	53	73.0 (68.1–77.9)	104	77.0 (73.7–80.2)
MVA and postabortion care	42	61.8 (53.8–69.8)	87	64.6 (59.7–69.4)
Vacuum extraction	46	70.7 (63.7–77.8)	98	73.2 (68.6–77.8)
Newborn resuscitation	50	66.7 (60.9–72.4)	100	72.2 (67.8–76.7)

Abbreviations: CI, confidence interval; MVA, manual vacuum aspiration.
[a] There were no significant differences in skills between doctors and midwives.

Providers scored markedly better on the maternity care scenario than on the newborn resuscitation scenario. In both scenarios, however, providers received low scores on specific steps in emergency care: for example, 41.8% on urgent actions and 58.6% on actions after control of convulsions in the labor/eclampsia scenario; and 39.2% for essential actions when the newborn does not cry and 4.6% for ventilation, despite much higher levels of training and confidence in this skill, in the newborn resuscitation scenario. No statistically significant differences were detected in decision-making scores between doctors and midwives after controlling for length of experience and patient volume (Table 4).

Analysis of correlation coefficients indicated that, compared with confidence, knowledge was more strongly correlated with provider decision making and performance, particularly among doctors (Table 5). After controlling for providers' length of experience and patient volume/resource capacity of facilities, the knowledge levels of both doctors and midwives were significantly correlated with decision-making skills in cases of eclampsia ($P=0.001$ and $P=0.005$, respectively); knowledge levels of doctors were significantly correlated with decision making regarding newborn resuscitation ($P=0.038$) and with performance of 4 of the 5 skills tested (MROP [$P=0.035$], MVA [$P=0.023$], newborn resuscitation [$P=0.011$], and delivery [$P<0.001$]). Confidence levels of midwives were significantly correlated with performance in 4 of the 5 areas (MROP [$P<0.001$], vacuum extraction [$P=0.018$], newborn resuscitation [$P<0.001$], and delivery [$P<0.001$]);

Table 2
Knowledge scores of EmONC providers in Afghanistan.[a]

Topics	Doctors		Midwives	
	No.	Average (95% CI)	No.	Average (95% CI)
Maternal care				
Focused prenatal care	81	68.9 (64.1–73.7)	141	63.6 (59.7–67.5)
Which pregnant women require special care plan	81	53.1 (47.6–58.6)	139	44.2 (40.3–48.2)
Signs of labor	82	84.5 (80.2–88.7)	142	84.0 (80.8–87.2)
What to observe to monitor labor progress	82	72.5 (67.0–78.0)	141	78.4 (74.9–81.9)
AMTSL	80	71.6 (67.4–75.7)	139	73.7 (70.5–77.0)
What to look for when a woman arrives with or develops heavy bleeding after delivery	82	82.5 (75.6–89.4)	141	75.5 (71.2–79.8)
What to do when a woman arrives with or develops heavy bleeding after delivery	81	71.8 (65.9–77.6)	141	65.1 (61.0–69.2)
What to do in case of retained placenta	82	52.1 (47.2–57.0)	141	47.6 (44.4–50.8)
Newborn care				
Immediate care given for last newborn delivered	80	67.4 (62.2–72.6)	142	65.5 (61.8–69.2)
Signs and symptoms of newborn infection	82	57.5 (52.4–62.6)	142	47.5 (43.5–51.5) [a]
Initial steps when newborn presents with signs of infection	82	55.1 (49.2–61.0)	142	48.0 (43.5–52.5)
Care for low birth weight newborn	82	49.5 (44.3–54.6)	142	45.7 (42.3–49.1)
Abortion and violence				
Immediate complications of unsafe abortion	82	72.9 (67.6–78.1)	142	61.3 (57.3–65.3) [a]
What to do when a woman presents with complications of unsafe or incomplete abortion	82	60.0 (55.0–65.1)	142	55.9 (52.1–59.6)
Information to give women treated for unsafe or incomplete abortion	82	49.5 (43.5–55.4)	142	44.2 (40.3–48.0)
What to do when a woman presents as rape survivor	82	31.7 (25.9–37.5)	142	27.5 (23.7–31.2)

Abbreviations: AMTSL, active management of the third stage of labor; CI, confidence interval; EmONC, emergency obstetric and newborn care.
[a] There is no overlap of the 95% CIs showing significant difference between doctors and midwives at $P<0.05$.

Table 4
Decision-making skills of EmONC providers in Afghanistan.[a]

Skills	Doctors		Midwives	
	No.	% (95% CI)	No.	% (95% CI)
Case scenario 1: maternity ward care for mother in labor after convulsions at home				
Urgent clinical examination	77	59.7 (56.1–63.2)	128	63.2 (60.4–66.0)
Diagnosis (of eclampsia)	82	70.7 (60.7–80.8)	135	63.7 (55.5–71.9)
Urgent actions	82	44.1 (38.9–49.4)	135	40.3 (36.6–44.0)
Emergency actions in case of convulsions	82	67.7 (63.4–71.9)	135	65.9 (62.0–69.8)
Essential equipment and supplies to manage most urgent condition	82	80.1 (75.8–84.3)	135	74.9 (71.1–78.8)
Actions after convulsions controlled	82	61.2 (56.8–65.7)	135	57.0 (53.2–60.7)
Actions after delivery	82	75.8 (70.9–80.8)	135	72.3 (68.5–76.2)
Average	65.6		62.5	
Case scenario 2: care for newborn not breathing at birth				
Basic equipment and supplies	82	70.5 (66.2–74.9)	134	64.7 (60.9–68.5)
Essential actions when newborn does not cry	82	36.6 (25.9–47.2)	135	40.7 (32.3–49.1)
Ventilation when newborn still not breathing	82	7.3 (1.6–13.1)	135	3.0 (0.1–5.9)
Action after resuscitation is complete	82	11 (4.1–17.9)	135	11.9 (6.3–17.4)
Average	31.4		30.1	

Abbreviation: CI, confidence interval.
[a] There were no significant differences in skills between doctors and midwives.

there was 1 such correlation (for newborn resuscitation [$P=0.032$]) among doctors.

At the facility level, using average scores, knowledge was significantly associated with both of the decision-making skills ($P<0.001$ and $P=0.008$) and with MROP, MVA, newborn resuscitation, and delivery ($P<0.001$ for all). Confidence was significantly associated with performance (MROP [$P<0.001$], newborn resuscitation [$P<0.001$], delivery [$P<0.001$], MVA [$P=0.005$], and vacuum extraction [$P=0.013$]) but not with decision-making skills ($P=0.378$ and $P=0.404$) (Table 5).

4. Discussion

Gaps in the knowledge and skills of the current workforce in Afghanistan need immediate attention. The present assessment indicates that attention is required for skills that address the 3 major causes of maternal death: pre-eclampsia/eclampsia; postpartum hemorrhage; and maternal sepsis. Where these skills were assessed, midwives' scores were 75% or lower in confidence in all 3 areas, in knowledge of postpartum hemorrhage, and in decision making in the eclampsia scenario. Among doctors, despite high confidence levels, scores were lower than 75% for knowledge of postpartum hemorrhage and decision making regarding eclampsia. With regard to newborn care, both doctors and midwives scored low on decision making about newborn resuscitation—a basic life-saving skill—even though levels of confidence were high.

Compared with midwives, doctors reported greater levels of confidence in their ability to perform most EmONC skills. Both training and work experience are important to healthcare providers' confidence and skills. In the present study, however, differences in length of experience did not seem to explain differences in confidence. Average length of experience was similar between the groups: 6.0 years for midwives and 6.3 years for doctors ($P=0.781$). Doctors' 7 years of education in a full-spectrum medical curriculum—compared with the shorter, more narrowly focused EmONC training of midwives—could contribute to doctors' higher levels of confidence. Indeed, some doctors may be overconfident. For nearly all skills, more doctors said they were very confident than said they had training in that skill (Table 1). Another possible explanation for the discrepancy between midwives' confidence and skills could be that doctors have a wider range of authority than midwives and may impose restrictions on midwives [16], whose confidence about delivering services could be damaged.

There were no significant differences between doctors' and midwives' performance scores. Knowledge scores tended to predict decision-making abilities and performance better than did confidence scores, although confidence may be more important to midwives' than doctors' performance and decision making.

The midwifery pre-service training program is 2 years, whereas pre-service training for doctors takes 7 years. The data indicate that the performance of midwives and doctors is generally comparable. This finding supports the argument that greater task sharing between doctors and midwives is feasible and effective—presumably, with lower costs—without diminishing the quality of care [17]. Indeed, awareness creation and collaboration have already begun between the

Table 5
Correlation of knowledge and confidence with decision-making and performance skills.

	Decision-making scenarios		Performance on anatomic models				
	Eclampsia	NBR	MROP	MVA	VE	NBR	Delivery
Doctors							
Knowledge average score	0.35 [a]	0.22 [a]	0.40 [a]	0.35 [a]	0.11	0.36 [a]	0.59 [a]
Number of areas with confidence	−0.03	0.10	0.15	0.18	0.17	0.30 [a]	0.25
Midwives							
Knowledge average score	0.24 [a]	0.06	0.47 [a]	0.24 [a]	0.10	0.47 [a]	0.55 [a]
Number of areas with confidence	0.12	0.02	0.37 [a]	0.20	0.24 [a]	0.36 [a]	0.38 [a]
Facility level							
Knowledge average score	0.42 [a]	0.30 [a]	0.56 [a]	0.44 [a]	0.23	0.59 [a]	0.61 [a]
Average number of areas with confidence	0.10	0.10	0.41 [a]	0.37 [a]	0.31 [a]	0.45 [a]	0.45 [a]

Abbreviations: MROP, manual removal of placenta; MVA, manual vacuum aspiration; NBR, newborn resuscitation; VE, vacuum extraction.
[a] $P<0.05$.

Afghan Midwives Association and the Afghan Society of Obstetricians and Gynecologists, and will probably become stronger in the future.

Further investigation is needed regarding what additional tasks midwives could—with training—take on; these may include treatment of sepsis and hypertensive disorders, forceps delivery, cervical suturing, and dilatation and curettage. The feasibility of training midwives for more complex skills such as cesarean delivery could be explored.

At the same time, increasing doctors' opportunities to practice EmONC skills by rotation of jobs within or between facilities would complement their pre-service training and strengthen their skills. Also, because it is culturally acceptable for women only to attend delivery, EmONC training for as many female doctors as possible would be strategic. Even when these female doctors were not appointed to obstetrics and gynecology units, this strategy would increase the likelihood that a competent and culturally acceptable provider would be available when an emergency occurred.

Team effect—examined using correlation coefficients among facility averages—resembled provider-level analysis, showing little confounding of the findings by the facility environment. Therefore, it is reasonable to use the findings of the present assessment to inform improvement strategies for all SBAs of various facilities.

Methodologically, a strength of the present study was the use of a variety of data collection methods to assess providers' EmONC competencies. To be competent, an EmONC provider must be appropriately trained, feel confident in performing procedures, be knowledgeable, perform skills correctly, and make good clinical decisions. Although the literature generally supports the use of multiple complementary data collection methods to capture different perspectives and aspects of a situation [18], there is little evidence specifically regarding the relative use of these methods for assessing providers' EmONC skills in low-income countries. The present findings indicate that providers' knowledge—an objective measure—is a stronger predictor of decision-making capacity and performance than is providers' confidence, which is less easily defined and measured. Direct observation of providers' performance may be the best assessment [19] but its use is limited by cost and the wait for emergency cases.

The main methodologic limitation of the present study was that security concerns prevented the assessment of all designated EmONC referral sites, as had been intended. We do not recommend generalizing the findings of the present assessment to other facilities not assessed.

The findings must be set in context. For example, levels of knowledge or skills in MVA may be low because of lack of equipment or the case load being too low for staff to practice such skills. A holistic, systemic perspective such as that of the larger Afghanistan EmONC assessment [12] is crucial for designing effective and efficient quality improvement.

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Conflict of interest

The authors have no conflicts of interest.

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